Indicator: Low Birthweight (091)

"Low birthweight" (LBW) is typically defined as any infant weighing <2,500 grams at birth. Weight is a critical health measure because low birthweight children are more prone to death and disability than their counterparts. Another important natality indicator is "very low birthweight" (VLBW), which is typically defined as any infant weighing <1,500 grams at birth.

Environmental exposures have been implicated as a risk factor for low birthweight (e.g., maternal smoking, maternal exposure to lead, DES, occupational exposures) (Kiely et al. 1994). However, the etiology of term-LBW (born 37+ weeks gestation) infants and preterm-LBW (born <37 weeks gestation) infants differs in that for term-LBW infants, most underlying causes (e.g., maternal smoking, weight at conception, and gestational weight gain) have been identified, where as for preterm-LBW infants, the etiology largely remains unexplained (CDC, 1994).

This indicator presents the percentage of LBW and VLBW infants born in the U.S. , based on natality data reported to the National Vital Statistics System. The NVSS registers virtually all deaths and births nationwide with data coverage from 1933 to present and from all 50 States and the District of Columbia.

What the Data Show

Figures 091-1 and 091-2 present the percentage of LBW and VLBW infants for the U.S. and each of the 10 EPA Regions for the years 1995-2001. The percentage of infants defined as LBW ranged from 7.3% in 1995 to 7.7% by 2001. The percentage of infants defined as VLBW was very stable and accounted for between 1.4% (1995, 1996, 1997, 2000, and 2001) and 1.5% (1998 and 1999) of all live births. In 2001, the percentage of LBW infants generally ranged from a high of 8.9% to a low of 5.8% for each of the EPA regions. From 1995 to 2001, the overall trend within each region increased slightly in the percentage of low birthweight infants. However, trends in the occurrence of very low birthweight infants have been relatively stable; varying less than 0.1% to 0.2% for each of the 10 EPA Regions.

Black women were generally twice as likely to have LBW infant and almost three times as likely to have VLBW infants between 1991 and 2000 compared to White and Hispanic women. This trend continued in 2001 and 2002. The percentage of LBW infants born among Black mothers was 12.9% (2001) and 13.3% (2002), compared to 6.7% (2001) and 6.8% (2002) among White women and 6.5% (2001 and 2002) among Hispanic women. The percentage of VLBW infants among Black women was 3.0% (2001) and 3.1% (2002), compared with 1.2% (2001 and 2002) among White women and 1.1% (2001) and 1.2% (2002) among Hispanic women

Differences in the percentage of LBW and VLBW infants among maternal age categories are apparent, especially at the extremes (i.e., younger mothers and older mothers). In 2002, the percentage of LBW infants born to mothers aged ≤19, 20-34, and 35+ years was 9.6%, 7.3%, and 9.0%, respectively. The percentage of VLBW infants for the same maternal age groups was 1.8%, 1.4%, and 1.7%, respectively.

Indicator Limitations

- Complete reporting of natality indicators such as LBW and VBLW may vary due to differences in the reporting requirements established by each state. It is possible that in some states the number of low birthweight babies may be under reported.

- Natality data are not available for the U.S. territories in CDC WONDER. Thus, Regions 2 and 9 are calculated to include only States.

Data Source

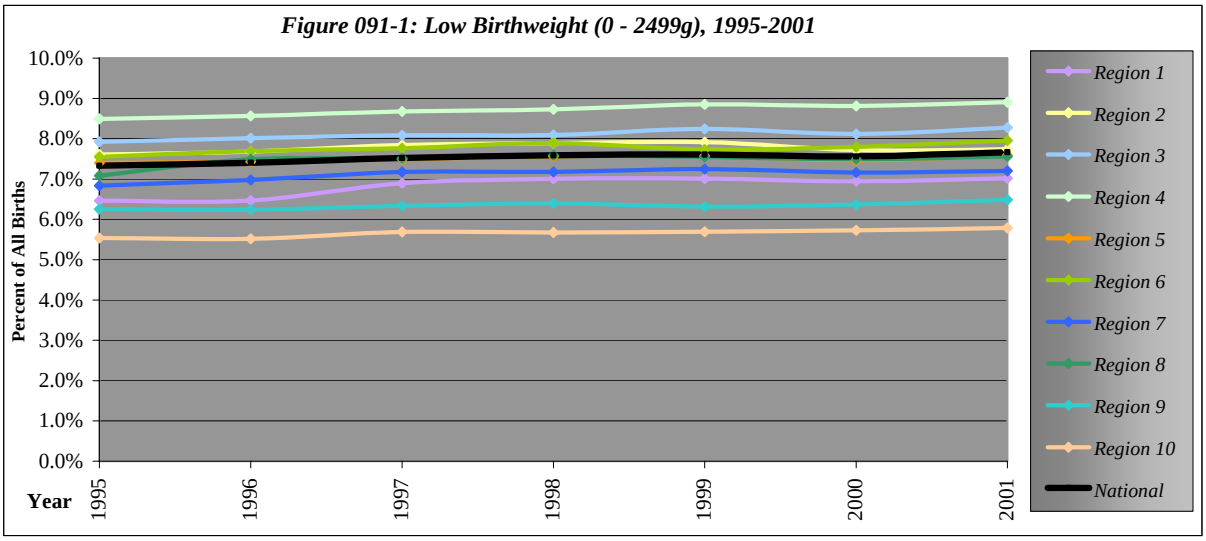
CDC. CDC WONDER: Natality Data Request. http://wonder.cdc.gov/nataJ.html

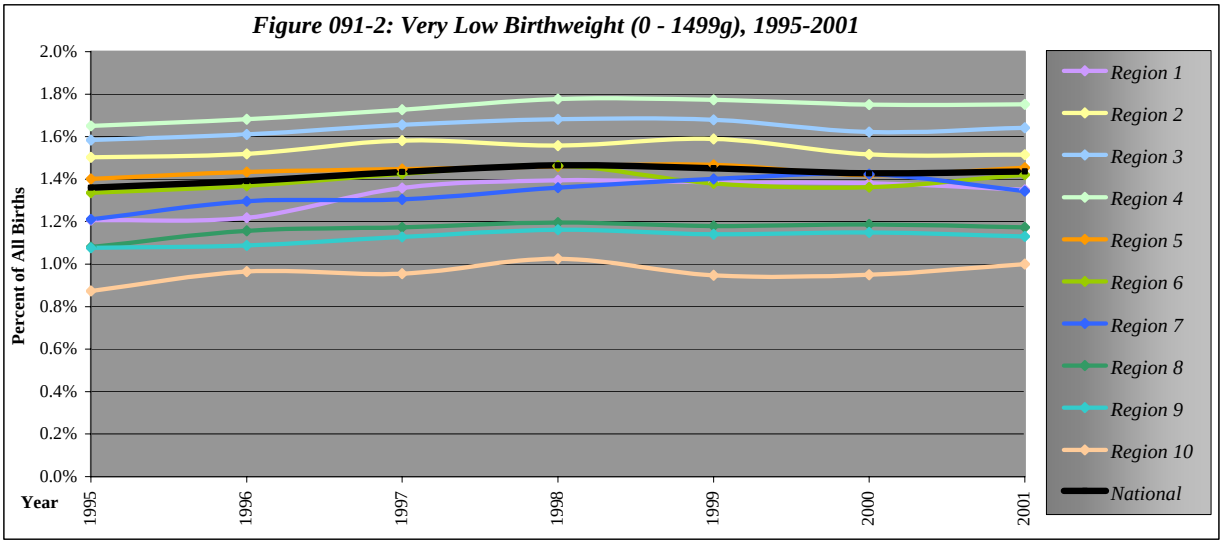
References

Center for Disease Control (CDC). 1994. Increasing Incidence of Low Birthweight -- United States, 1981-1991. MMWR 43:335-339. Accessed February 2, 2005. http://www.cdc.gov/mmwr/preview/mmwrhtml/00030918.htm

Kiely JS, Brett KM, Yu S, and Rowley DL. 1994. Low Birthweight and Intrauterine Growth Retardation. eds. Wilcox LS and Marks JS.In. From Data to Action CDC's Public Health Surveillance for Women, Infants, and Children CDC's Maternal & Child Health Monograph 1994. Center for Disease Control: Atlanta, GA.

Graphics





R.O.E. Indicator QA/QC

Data Set Name: LOW BIRTHWEIGHT
Indicator Number: 091 (89091)
Data Set Source: CDC, NCHS
Data Collection Date: ongoing
Data Collection Frequency: yearly
Data Set Description: Low Birthweight
Primary ROE Question: What are the trends in human disease and conditions for which environmental pollutants are thought to be to risk factors including across population subgroups and geographic regions?

Question/Response

T1Q1 Are the physical, chemical, or biological measurements upon which this indicator is based widely accepted as scientifically and technically valid?

Yes. The National Vital Statistics System (NVSS) is the oldest and most successful example of inter-governmental data sharing in Public Health and the shared relationships, standards, and procedures form the mechanism by which NCHS collects and disseminates the Nation's official vital statistics. The methodology for collecting vital statistics is standardized and outlined in Model State Vital Statistics Act and Regulations Revised April 1995, DHHS publication (PHS) 95-1115 (http://www.cdc.gov/nchs/data/misc/mvsact92aacc.pdf).

T1Q2 Is the sampling design and/or monitoring plan used to collect the data over time and space based on sound scientific principles?

Yes. The National Vital Statistics System is responsible for the Nation’s official vital statistics. These vital statistics are provided through State-operated registration systems. Standard forms for

the collection of data and model procedures for the uniform registration of the events are developed and recommended for State use through cooperative activities of the States and the NCHS (http://www.cdc.gov/nchs/data/dvs/birth11-03final-ACC.pdf). U.S. Standard Birth Certificates are revised periodically. Most state certificates conform closely in content and arrangement to the standard certificate recommended by NCHS and all certificates contain a minimum data set specified by NCHS. One section of the Standard Birth Certificate is reserved for birth weight. The mother provides demographic information on the birth certificate, such as race and ethnicity, at the time of birth. Medical and health information is based on hospital record.

T1Q3 Is the conceptual model used to transform these measurements into an indicator widely accepted as a scientifically sound representation of the phenomenon it indicates?

Yes. The data collected by NVSS are routinely referenced and used in epidemiological studies. Regional data: The raw numbers for each state were downloaded from the CDC WONDER natality database (http://wonder.cdc.gov/nataJ.html). The raw numbers for each state within a region were combined and percentages for each region calculated.

T2Q1 To what extent is the indicator sampling design and monitoring plan appropriate for answering the relevant question in the ROE?

Virtually all births are registered with the NVSS nationwide. The temporal coverage of the data is from 1933 to present. Data are collected from all 50 States including the District of Columbia.

T2Q2 To what extent does the sampling design represent sensitive populations or ecosystems?

The data set has nationwide birth reporting, including sensitive populations.

T2Q3 Are there established reference points, thresholds or ranges of values for this indicator that unambiguously reflect the state of the environment?

Not applicable

T3Q1 What documentation clearly and completely describes the underlying sampling and analytical procedures used?

The sampling and quality assurance information can be found in Model State Vital Statistics Act and Regulations Revised April 1995, DHHS publication (PHS) 95-1115 (http://www.cdc.gov/nchs/data/misc/mvsact92aacc.pdf). Documentation is also available at http://wonder.cdc.gov/wonder/help/nata.html Data source for Table HH3: CDC. CDC WONDER: Natality Data Request. http://wonder.cdc.gov/nataJ.html

T3Q2 Is the complete data set accessible, including metadata, data-dictionaries and embedded definitions or are there confidentiality issues that may limit accessibility to the complete data set?

The data can be accessed up to the county level through the electronic data warehouse for CDC at http://wonder.cdc.gov/nataJ.html. Individual level data are not available due to confidentiality issues.

T3Q3 Are the descriptions of the study or survey design clear, complete and sufficient to enable the study or survey to be reproduced?

Yes. Virtually all births from the 50 states, including District of Columbia, submit birth data to the NVSS at NCHS. The recommended birth certificate is posted at http://www.cdc.gov/nchs/data/dvs/birth11-03final-ACC.pdf. The documentation for the birth set is at http://wonder.cdc.gov/wonder/help/nata.html.

T3Q4 To what extent are the procedures for quality assurance and quality control of the data documented and accessible?

See answer to T3Q1

T4Q1 Have appropriate statistical methods been used to generalize or portray data beyond the time or spatial locations where measurements were made (e.g., statistical survey inference, no generalization is possible)?

Not applicable

T4Q2 Are uncertainty measurements or estimates available for the indicator and/or the underlying data set?

Not applicable

T4Q3 Do the uncertainty and variability impact the conclusions that can be inferred from the data and the utility of the indicator?

Not applicable

T4Q4 Are there limitations, or gaps in the data that may mislead a user about fundamental trends in the indicator over space or time period for which data are available?

Regional data: Natality data are not available for the U.S. territories in CDC WONDER. Thus, Regions 2 and 9 are calculated to include only States.

Generation of Regional Natality Rates

Data set name(s): Indicator Graphs
Low Birth Weight by EPA Region
Very Low Birth Weight by EPA Region
Preterm Delivery by EPA Region

Data set date(s): 1995-2001 (data available at time of query)

Data source: CDC. WONDER Natality file1995–2001.
http://wonder.cdc.gov/nataJ.html

Data description:
Natality indicators are defined as:

- Low Birth Weight (0-2,499 grams)
- Very Low Birth Weight (0-1,499 grams)
- Preterm Delivery (0-36 weeks gestation)

Downloading and organizing the data:

- Natality data were accessed through CDC's WONDER database (http://wonder.cdc.gov/).

- We downloaded a raw data file containing the following data fields: year of birth; state of maternal residence; count of all births; count of "low birth weight" births (0-2,499 grams); count of "very low birth weight" births (0-1,499 grams); and count of "preterm delivery" births (0-36 weeks).

- The regional data file was produced by aggregating natality data for the 50 states and the District of Columbia into the ten EPA regions to obtain the total number of births and natality indicator counts for each region, by year. No natality data were available for U.S. territories. (For a map of the EPA regions, refer to http://www.epa.gov/epahome/whereyou-live.htm.)

- An Excel worksheet was produced for each natality indicator displaying either, the percentage of births that were defined as low birth weight, very low birth weight, or preterm delivery, by EPA region for the years 1995 – 2001. All cases for a given indicator (e.g., very low birth weight) are summed by year within each region.

- No adjustments (e.g., calculating age-adjusted rates) to the raw data were required for the natality dataset.

- Rates are expressed as percentages and calculated by dividing the number of observations in each of the regions (e.g., low birth weight babies) by the total number of births in the corresponding regions and multiplying by 100.